STATE OF MONTANA
MONTANA DEPARTMENT OF TRANSPORTATION
JOB PROFILE

☑ Update

☐ Formal Review

Date Submitted: 1/8/14

SECTION I - Identification

Working Title: CE Specialist

Department: Transportation

Job Code Number: 172516

Division & Bureau:
Engineering Division & Materials Bureau

Job Code Title: CE Specialist

Section & Unit:
Pavement Analysis & Research
Project Engineering Unit

Pay Band: 6

Work Address:
2701 Prospect Avenue
Helena, MT 59620

Position Number: 40046

Phone: (406) 444-6295

☐ FLSA Exempt ☑ FLSA Non-Exempt ☐ Non-Union ☐ MPEA ☐ Blue Collar

Profile Completed By: Darin Reynolds, Unit Supervisor **Work Phone:** 444-7650

Work Unit Mission Statement or Functional Description:
The Highways and Engineering Division prepares projects for bidding and coordinates highway construction through two primary functions: Preconstruction and Construction. Specific Preconstruction functions are administered by the Bridge, Consultant Design, Engineering Information Services, Environmental Services, Preconstruction, Right-of-Way, and Traffic and Safety bureaus in addition to five District Construction Offices in Billings, Butte, Great Falls, Glendive, and Missoula for budget purposes. Specific Construction functions are administered by: Contract Plans, Construction Engineering Services, Construction Administration Services, and Materials.

The principal goals of the Materials Bureau are to develop and implement comprehensive data collection, testing, and analysis programs that facilitate pavement project selection and pavement surface and subsurface design that addresses Montana's most important statewide transportation needs and to support the quality of materials incorporated into Montana's highway system. These activities help officials select projects and provide information for short and long-range engineering and construction programs. These goals are addressed through the complex interaction and

interrelationship of the Bureau's three Sections. The Bureau consists of the Geotechnical Section, Physical Testing Section, and Pavement Analysis Section.

The Pavement Analysis Section's mission is to gather, arrange, and analyze transportation data in a competent, precise and purposeful manner; provide suitable and cost effective pavement designs and treatments for rehabilitated roadways statewide. The Section collects pavement distresses, stress/strain information, and geotechnical information for existing roadway, current and future traffic, construction phasing and roadway plans and uses deflection data to determine feasible overlay alternatives. A variety of treatments ranging from short-term to total reconstruction may be considered depending on roadway type and condition. All alternatives are subjected to cost analysis. A central element of the Section's function is to provide service to its internal and external clients in the form of pavement analysis products. These products range, from detailed management Section treatment reports to university research, and characterize a broad range of topics and disciplines, both internal and external to MDT. The Section develops, maintains, and administers complex, comprehensive data collection and engineering analysis programs and maintains comprehensive condition, deflection, research, and surfacing data bases used in highway design, highway maintenance, transportation planning, safety, materials, federal certification, university research, and allocation and distribution of maintenance funds and federal highway funds in accordance with statutory funding formulas. The Section maintains and administers several elements of the MDT Project Management System, Pavement Management System, AASHTO Pavement Design System, Nondestructive Testing Program, Local Transportation Assistance Program, University Research Program, and Materials Information System. The Section is also responsible for providing information and analysis for external customers such as Federal Highways, Federal Forest Service, Federal Park Service, and Montana County and Local governments in the areas of pavement design, management, and research. The Section evaluates special studies and plans, provides executive management with empirical data for complex, potentially controversial decisions regarding pavement project selection, pavement design, and pavement maintenance and is responsible for the statistical accuracy of reports to MDT executive management, Divisions, and external customers. The Pavement Project Engineering Unit designs all pavement and structural soils requirements for all statewide construction and rehabilitation projects. The Unit provides engineering analysis and design services as well as economic analysis to develop quality and cost-effective pavement designs for various projects. Recommendations are provided to all Bureaus and Districts within the Department and serve as a foundation for major statewide construction and rehabilitation projects.

Describe the Job's Overall Purpose:

This position serves as a technical authority in pavement analysis and design procedures and applications and is responsible for managing statewide design projects; analyzing specific project needs and requirements; developing and/or overseeing design procedures and work products; providing training and technical assistance; and performing a variety of other duties as assigned. The incumbent reports to the Project Engineering Unit Supervisor (#40072).

SECTION II - Major Duties or Responsibilities ***% of Time***

A. PROJECT MANAGEMENT 30%

This position serves as an authority in complex aspects of pavement analysis and design and is responsible for managing design projects for statewide construction and maintenance activities; developing and recommending new procedures, standards, and design alternatives; directing and overseeing the work of consultants; providing quality assurances; analyzing, evaluating, and providing initial approval for designs; monitors project budgets; and resolving advanced technical problems and/or research needs.

1. Manages pavement analysis and design projects for the Division to ensure the overall quality and cost-effectiveness of surfacing designs used for all statewide construction and rehabilitation projects. Evaluates current and projected workflow, relative complexity of designs (e.g., gravel vs. cement treated, heavy vs. light road volumes, etc.), and project guidelines. Monitors projects to measure progress, resolve problems, and ensure timely delivery of major design projects.

2. Develops and recommends new procedures, standards, and surfacing design alternatives to reflect changing project needs, design theories, standards, technologies, value engineering principles, and available materials. This involves ongoing research and evaluation of new developments in pavement design and changing project needs (e.g., efficiency, safety, cost-effectiveness, etc.) to recommend enhancements to the Division's pavement design function.

3. Reviews the work of consultants involved with pavement analysis and design projects to ensure the overall quality of work procedures and products as well as compliance with the terms and conditions of individual agreements. This involves explaining and monitoring project needs, Department procedures and standards, and contract requirements; reviewing work products and resolving technical or procedural problems; and reviewing and approving claims and payments based upon contract delivery.

4. Provides ongoing quality assurances for design procedures and products to develop new approaches to various design needs and impediments, resolve process deficiencies (e.g., communication, technologies, etc.), and recommend procedures and standards that promote quality, efficiency, and cost-effectiveness.

5. Analyzes and evaluates designs developed by staff and consultants to ensure consistency, constructability, and conformance with engineering and design standards. Identifies errors and deficiencies; determines the need for additional analysis or design modifications; ensures that designs reflect project needs, standards, timelines, and cost parameters; and provides initial approval. Develops and incorporates value engineering alternatives that meet project requirements while minimizing costs.

6. Evaluates budget projections to determine cost of materials relative to design standards and project requirements. Develops and recommends design and cost (i.e., value engineering) alternatives to provide an optimum combination of safety, cost-effectiveness, environmental security, maintenance requirements, and design functionality.

7. Provides advanced technical assistance, serving on various research and planning workgroups, and responding to complex issues referred by other Bureaus, Districts, and consultants on various aspects of pavement design. Because all pavement design work originates in the Department's centralized offices, the position serves as a critical technical resource for District staff and management as well as Helena personnel on the most complex aspects of pavement design.

B. PAVEMENT ANALYSIS 30%

This position compiles and analyzes design information for a variety of construction and rehabilitation projects to integrate site-specific features into plans. This involves compiling and evaluating complex soils, materials, traffic, pavement deflection and distress data, and materials costs required for pavement analysis and design; evaluating environmental, biological, historic, terrain, climate, land use, utility, right-of-way, and other pertinent information for incorporation into the preliminary design; reviewing project nominations, design proposals, field notes, correspondence, reports, and related documentation; contributing to and reviewing Preliminary Field Review reports; analyzing and evaluating field survey data to determine the overall condition of roadway materials; determining optimum materials for use on specific construction projects; gathering and analyzing soils survey, deflection, and distress data; determining the need for and requesting additional soils and materials testing and sampling; and developing solutions to unique problems encountered through the design of construction and rehabilitation projects.

1. Compiles and evaluates complex soils, materials, traffic, pavement deflection and distress data, and materials costs required for pavement analysis and design to determine the optimum materials (e.g., gravel, cement-treated mix, etc.) and design strategy (e.g., repair or resurface). This involves reviewing data in terms of impact on other parts of the project, taking into consideration such factors as cost-efficiency, type of project, location/topography, current condition, durability of various materials based on prior projects, available right-of-way, and other engineering and design considerations.

2. Evaluates environmental, biological, historic, terrain, climate, land use, utility, right-of-way, and other pertinent information for incorporation into the preliminary design to ensure all surfacing design project impacts and requirements are identified and addressed. Coordinates with District and Helena materials and design personnel to resolve materials and design problems and constructability issues and to discuss proposed design alternatives.

3. Reviews project nominations, design proposals, field notes, correspondence, reports, and related documentation to identify appropriate information for inclusion in the basic surfacing design plan. Evaluates the physical characteristics of the site in context of construction standards to identify the geometrics and determine survey information needed through site review. Identifies design problems and alternatives to improve safety and ensure projects comply with current standards.

4. Contributes to and reviews the Preliminary Field Review (PFR) report to ensure inclusion of site features and preliminary project requirements. This includes evaluating survey information, attending alignment and grade meetings, adding alignment or other details to the PFR, and incorporating comments from the meetings into the report. Provides input and recommendations for repair and rehabilitation strategies based on available funding, feasibility of proposed strategy, best fix according to designs, availability of materials, and other considerations in addition to compliance with all applicable guidelines and specifications.

5. Analyzes and evaluates field survey data to determine the overall condition of roadway materials and the nature, severity, and causes of materials failure and/or endurance. Investigates ongoing construction projects for altered conditions to determine whether surfacing designs must be recomputed and provides recommendations for appropriate revisions to surfacing designs in accordance with all applicable materials design standards and specifications.

6. Determines optimum materials for use on specific construction projects based upon sound engineering and design principles related to stresses/strains, compaction, elasticity, moisture

tolerance, fluid mechanics, and other engineering and design considerations as well as availability, cost, transportation, and production timelines associated with various materials.

7. Gathers and analyzes soils survey, deflection, and distress data to ensure the accuracy and integrity of data in comparison to federal and department modules, standards and specifications. Evaluates data to determine whether soil will support proposed construction, and other considerations; identifies errors, inconsistencies, and anomalies in data; and performs various calculations, conducts research, and coordinates with District designers and other design personnel as needed to resolve errors and develop unique solutions to materials design problems.

8. Determines the need for and requests additional soils and materials testing and sampling to ensure the adequacy of soils and materials data. Identifies deficiencies or areas of ambiguity in existing data, and determines whether additional testing and sampling are needed to ensure accuracy and completeness of critical materials data for use in surfacing design plans.

9. Develops solutions to unique problems encountered through the design of construction and rehabilitation projects. This involves examining and interpreting various problems (e.g., rutting in roads topped with plant mix) and conducting research of prior similar projects and new technologies, coordinating with supervisor, and using engineering judgment to determine feasible solutions to problems.

C. SURFACING DESIGN 20%

This position develops surfacing design plans to document design features, materials, and special provisions for new construction or rehabilitation projects. This involves developing initial pavement and surfacing designs; manipulating and entering plan data into computer-assisted design software; developing and documenting design details by integrating surfacing design standards with unique project characteristics; evaluating and providing comments regarding special provisions, various reports, and preliminary designs; developing cost estimates; submitting surfacing design plans for a wide range of projects; participating in plan-in-hand meetings; incorporating design changes resulting from the plan-in-hand meeting; and finalizing surfacing design plans using computer-assisted design software and drafting equipment.

1. Develops initial pavement and surfacing designs, including standard plans and design exceptions, to ensure that designs are constructible, safe, in compliance with construction standards and materials specifications, and minimize environmental impacts. This includes determining the optimal design to address compliance and safety factors, then customizing designs to integrate site-specific characteristics that require design modifications. Evaluates the safety, constructability, cost, and compliance of design alternatives. The incumbent must apply innovation and professional judgment as necessary to resolve unique and/or unprecedented design issues. Evaluates available alternatives to develop the most cost-effective options.

2. Develops and documents design details by integrating surfacing design standards with unique project characteristics. Develops new or innovative designs for construction or rehabilitation projects by considering and applying factors such as soils, project, community, traffic, load requirements, safety, and economic criteria along with recommendations from the field and other department work units.

3. Evaluates and provides comments regarding special provisions, various reports, and preliminary designs to ensure projects are built to current design, detailing, and construction standards, and to ensure adequate consideration of all essential materials design elements.

4. Develops cost estimates to document the costs of the proposed scope of work, determine project feasibility, and provide information needed for final contract plans. Calculates project

material and labor costs based on the year's average bid prices. This includes consulting the standard bid prices spreadsheet, researching past projects, and comparing costs for similar projects. Develops cost estimates for each proposed design alternative to determine the most cost-effective solution. Participates and provides input on the Board of Review for the development of the engineers cost estimate for projects.

5. Submits surfacing design plans for a wide range of projects to all involved work units for preliminary review of alignment, grade, and other design features; gathers comments regarding field and other work unit problems and proposed solutions (design alternatives); and changes plans accordingly. This involves coordinating with other designers regarding alignment, grade, etc. to determine the adequacy and pertinence of soils and other materials data for incorporation into the plans for the specific project. Incorporates any new design standards into plans, and continually updates and revises plans to incorporate new processes and tools (e.g., new software).

6. Participates in plan-in-hand meetings to provide recommendations and comments and to compile information related to design changes or additions. This involves tracking comments and suggestions from meeting participants, providing comments regarding materials design alternatives, incorporating this information into reports or memoranda, and coordinating design changes with the appropriate work units.

7. Incorporates design changes resulting from the plan-in-hand meeting and subsequent processes to implement changes in a cost-effective manner in compliance with surfacing design and construction standards. Implements changes within limits imposed by economic, environmental, and safety factors and revises plans and special provisions as needed. Adjusts cost estimates to reflect changes in design plans using computer design and manual calculations.

D. TECHNICAL ASSISTANCE AND TRAINING 15%

This position provides advanced training, guidance, and technical assistance to other professional designers, engineering and field project personnel, and consultants on specialized applications of MDT design methods and practices as well as new design practices and technologies. This involves providing examination of surfacing designs and soils and design data prepared by consultants; maintaining a contemporary knowledge of construction and design practices, software, and other job-related skills by attending training, seminars, and education; providing design and design plan interpretation consultation and guidance to other department personnel; training or providing technical assistance to other designers and consultants on the application of new design practices, technologies, and standards; providing project-related guidance and technical expertise to other departmental work units regarding issues such as pavement analysis, surfacing design, and design alternatives and solutions; and performing special materials research projects related to new materials and techniques in pavement design.

1. Examines surfacing designs and soils and design data prepared by consultants. Reviews plans and data for discrepancies, inconsistencies, errors, or omissions. This involves reviewing and interpreting all survey information, test data, and design data. Reviews proposed plans, details, and test data to ensure the designs and tests are accurate and consistent with MDT design standards and materials specifications, and to ensure the constructability of designs.

2. Maintains a contemporary knowledge of construction and design practices, software, and other job-related skills by attending training, seminars, and education to maintain continuing professional development. Maintains contact with other MDT personnel, and conducts continual research to maintain a current knowledge of state and federal policies and standards, and other job-related issues.

3. Provides design and design plan interpretation consultation and guidance to other department personnel throughout the course of projects. This includes interpreting and explaining advanced technical aspects of surfacing designs, and analyzing, evaluating, and making recommendations to supervisor on problems encountered.

4. Trains or provides technical assistance to other designers and consultants on the application of new design practices, technologies, and standards to ensure that best practices are effectively incorporated into design processes.

5. Provides project-related guidance and technical expertise to other departmental work units regarding issues such as pavement analysis, surfacing design, and design alternatives and solutions. Provides recommendations for materials design standards and design procedures.

6. Performs special materials research projects related to new materials and techniques in pavement design, writes reports to document findings, and provides recommendations to supervisor based on results.

E. OTHER DUTIES 5%

This position performs a variety of special studies, project management activities, and other duties as assigned by supervisors in support of the Department mission and Division objectives. This includes exchanging information with contractors, agency staff, and the public; providing training, education, and professional and technical assistance; directing special projects; and attending ongoing education and training as directed.

The following duties and/or specific tasks listed under section II above are considered "essential functions" because they require specialized expertise and skill and are the primary reasons the job exists (they must be performed by this position with or without accommodations):

Duty A: Project Management
Duty B: Pavement Analysis
Duty C: Surfacing Design
Duty D: Technical Assistance and Training

The following mental and physical demands are associated with these essential functions:

PHYSICAL

- Lifting heavy objects (pavement samples, analytical equipment, etc.) up to 50 lbs.
- Ability to walk over uneven terrain or in water
- Remaining seated for extended periods of time, with occasional walking; standing; bending
- Extensive travel (over 1,000 miles/month)
- Operating a personal computer
- Communicate in writing, in person, and over the phone

MENTAL

- Ability to multi-task
- Demands for accuracy in all aspects of work
- Ability to meet inflexible deadlines
- Decision making that affects public health and safety
- Computing arithmetic operations
- Comparing data
- Compiling information

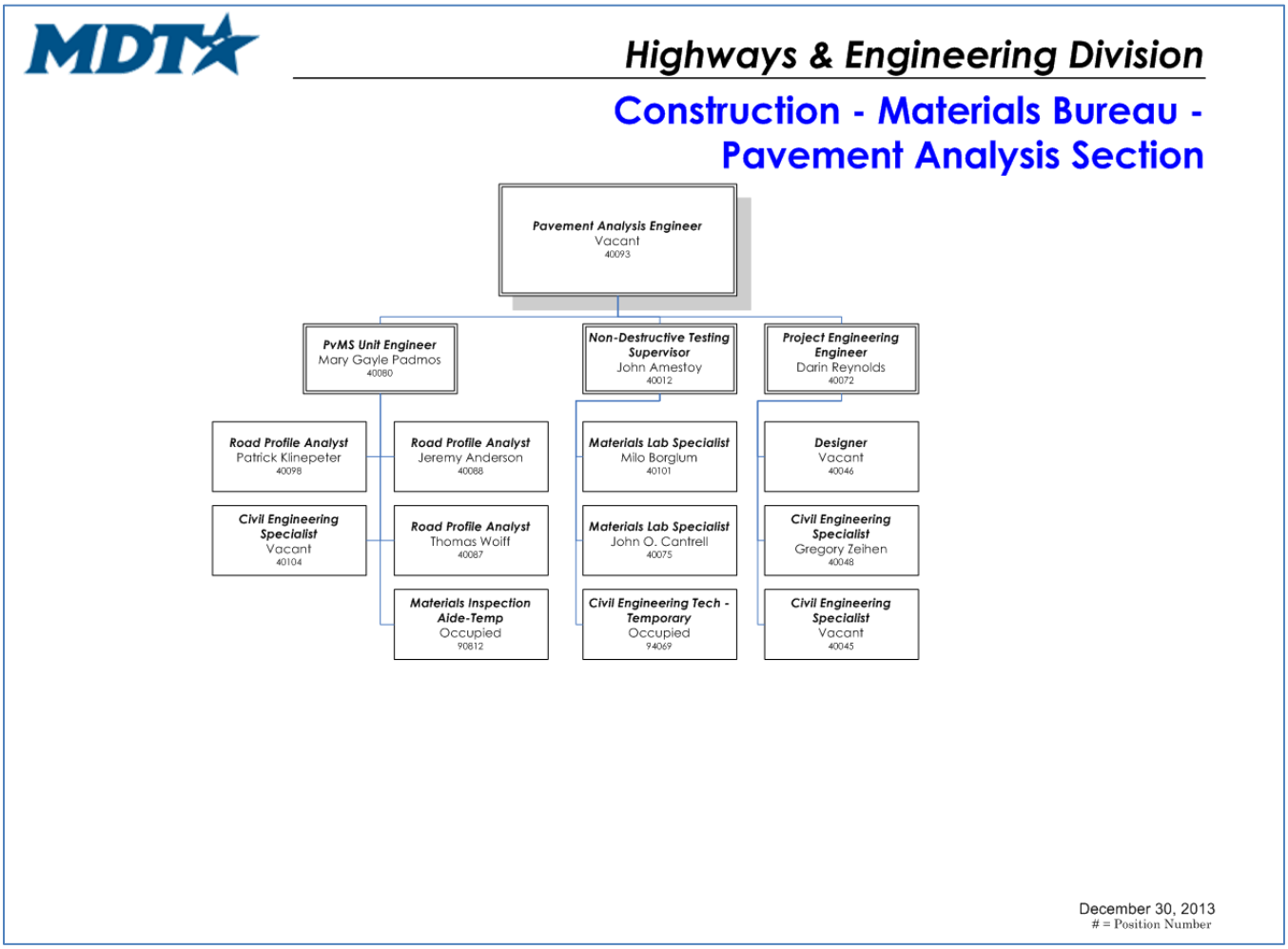
- Analyzing
- Coordinating
- Synthesizing
- Instructing

Predominant work is performed in a normal office environment and in the field, involving:

- Exposure to extreme weather
- Exposure to loud noises
- Exposure to high temperature substances
- Exposure to high-speed traffic

Does this position supervise others? ☐ **Yes** ☑ **No**

Attach an Organizational Chart.



SECTION III - Minimum Qualifications - List minimum requirements for the first day of work.

Critical knowledge and skills required for this position:

KNOWLEDGE:
This position requires advanced knowledge of the principles and practices of pavement design and analysis, drafting, engineering fundamentals, college-level mathematics including algebra and

geometry; construction processes; state and federal construction and design detailing standards; advanced research methods; technical writing principles; and computer-assisted design software. The position also requires knowledge of road and bridge design practices, policies, and procedures; applicable state, federal, AASHTO, and FHWA requirements and standards; materials specifications and standards; and the functions and responsibilities of the various specialty work units within the MDT. Project management responsibilities also require knowledge of project planning methods, contract administration, and cost analysis.

SKILLS:
The position also requires skill in the operation of computer-assisted design, spreadsheet, and word processing software; reading and interpreting technical plans and specifications; communicating effectively verbally and in writing; problem-solving; negotiation.

Behaviors required to perform these duties:

Analytical/Interpretive Thinking: Accurately applies new research findings, technical analyses, new methods and technologies, engineering design standards, and project requirements to specific circumstances.

Decision Making: Evaluates multiple factors to resolve problems. Develops technically and legally defensible courses of action in response to complex or ambiguous design issues; research conclusions and recommendations; and project management problems.

Achievement: Achieves goals and brings projects to completion. Persists and stays focused when faced with a series of challenging or uncertain situations. Demonstrates a concern for working well or for competing against a standard of excellence.

Independence of Action: Determines appropriate responses to geotechnical project problems and opportunities with minimal assistance or precedent.

Team Work: Able to share due credit with coworkers; display enthusiasm and promote friendly group working environment; work closely with other departments as necessary; support group decisions and solicit input from coworkers; display team spirit.

Flexibility: Able to remain open-minded and change opinions on the basis of new information; perform a wide variety of tasks and change focus quickly as demands change; manage transitions effectively from task to task; adapt to varying customer needs.

Education:
Check the one box indicating minimum education requirements for this position for a new employee the first day of work:

☐ No education required	☐ Related AAS/2-years college/vocational training
☐ High school diploma or equivalent	☑ Related Bachelor's Degree
☐ 1-year related college/voc. training	☐ Related Master's degree

Please specify the acceptable fields of study:

The position requires a Bachelor's degree in Civil Engineering, Civil Engineering Technology, or Construction Engineering Technology.

Other education, training, certification, or licensing required:
Fundamentals of Engineering certificate required at the start of employment.

Experience:
Check the one box indicating minimum work-related experience requirements for this position for a new employee the first day of work:

- ☐ No prior experience required
- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☑ 4 years
- ☐ 5 or more years

Other specific experience (optional):
The position requires two years of progressively responsible highway design, materials or construction experience, including at least one year of project management experience.

Alternative Qualifications:
This agency will accept alternative methods of obtaining necessary qualifications.

☑ Yes ☐ No

Alternative qualifications include:
A related Master's degree (with the required Bachelor's degree) may substitute for two years of related professional work experience. Related bachelors and masters degrees will be evaluated on a case-by-case basis by the selection committee.

SECTION IV – Other Important Job Information

- ☐ Fingerprint check
- ☐ Background check
- ☑ Valid driver's license
- ☐ Other; Describe

Other information including working conditions such as shifts, lifting requirements, travel or hours:

Extensive travel with overnight stays may be required (over 1000 miles/month). Long work shifts may also be required.

SECTION V – Signatures

Signature indicates this statement is accurate and complete.

Employee: Steve McEvoy

Name: _____ Title: _____

Signature: _____ Date: _____

Immediate Supervisor: Darin Reynolds

Name: _____ Title: _____

Signature: _____ Date: _____

Bureau Chief: Matt Strizich

Name: _____ Title: _____

Signature: _____ Date: _____

Division/District Administrator: Dwane Kailey

Name: _____ Title: _____

Signature: _____ Date: _____

Department Designee:

Brent Rabe/Designee

Human Resources Administrator
Human Resources Division

Signature: _____ Date: _____